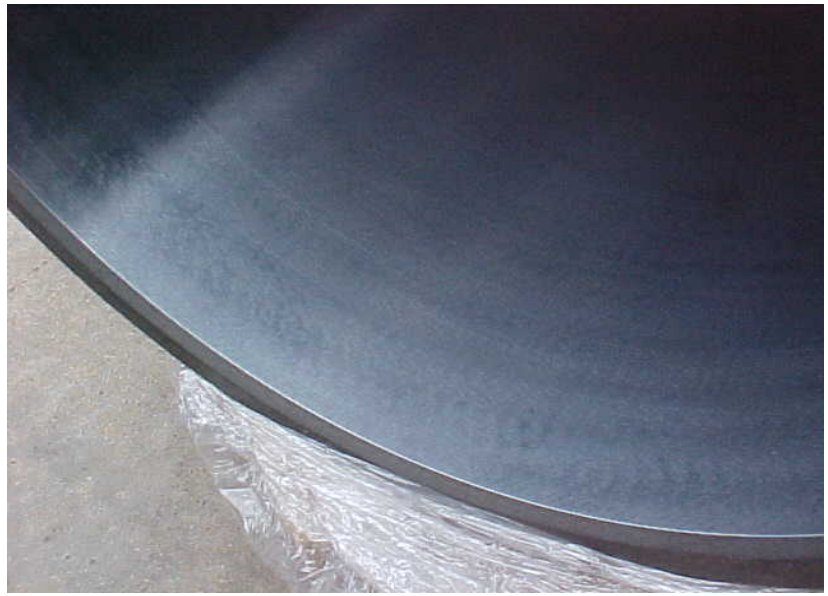
M1A1 Cannon Cradle Repair at Anniston Army Depot



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24th Replacement of Hard Chrome Plating Program Review Meeting, July 20-21, 2004, Park City, UT. Sponsored by SERDP/ESTCP.

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15. SUBJECT TERMS

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The Problem

- M1A1 Abrams Tank Gun Cradle Corrosion
- No Ability to Repair Large Pits
- Cradles in ~ 10 % of Tanks Overhauled are Salvage due to corrosion

The Program

- Large corrosion pits 1/8” by 3/8” – 0.060” deep
- Build up pits with base material
- Base material - 4130 steel
- Repair material – Inconel 718

The Payoff

- Reclamation of Serviceable Gun Cradles
- Cost of New Cradle = $25K
- Cost of Repair = $700 per Cradle
- Cost Saving of $360K per year at Anniston (15 Cradles)

Procedure

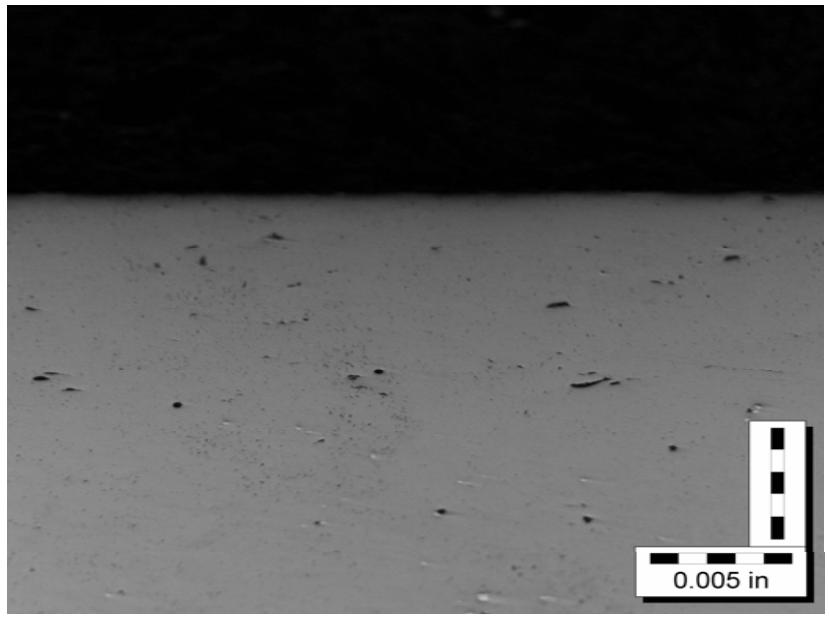
- Clean cradle using vapor degreaser.
- Using hand-held grinder w/wire brush, remove corrosion from pit.
- Using hand-held grinder w/grinding tool, break the sharp edges of the pit.
- Using the ESD Equipment fill the pit to .005” - .010” above the parent material surface.
- Using ID grinder, grind ID to prepare for chroming.
- Chrome plate and finish grind.

Initial Repair Process
ESD Settings

- Pulse Rate – 580 Hz
- Capacitance – 20 mfd
- Voltage – 100 volts
- Step Rate – 270 Hz
- Swing – 3
- Rotate Increment – 3
- Direction – CW
- Interval – 6

Development of Improved Process ESD Settings

- Pulse Rate – 400 Hz
- Capacitance – 30 mfd
- Voltage – 150 volts
- Step Rate – 340 Hz
- Swing – 3
- Rotate Increment – 3
- Direction – CW
- Interval – 6
- Argon Gas Atmosphere

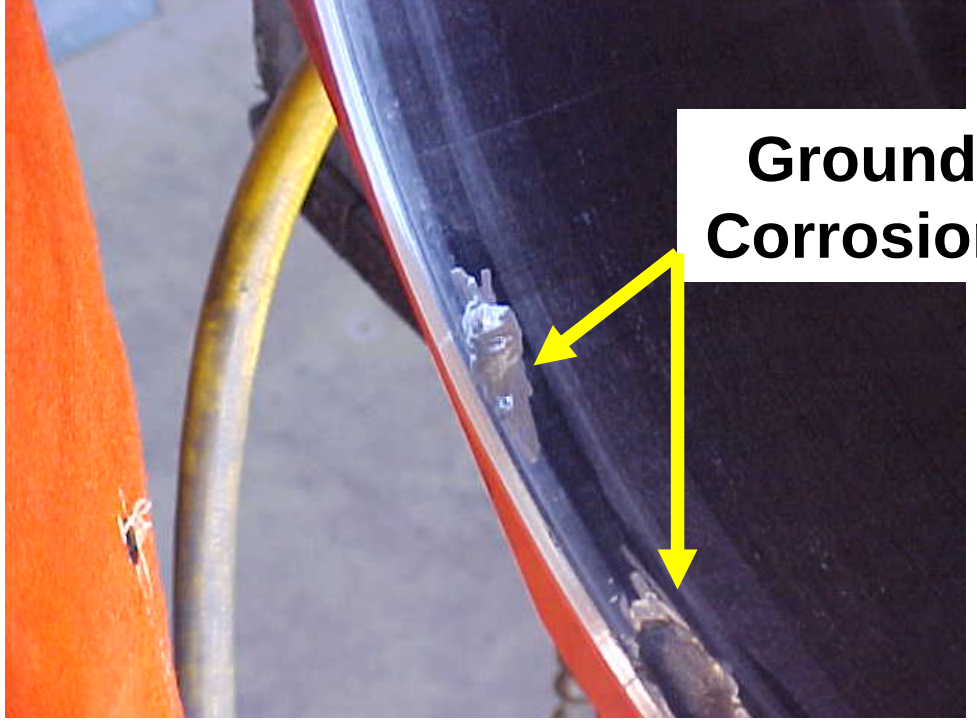


Micrograph of ESD applied Iconel 718 (.010” dimple)

Inspection

Characteristic	Method of Inspection	Requisite
Serviceability	Visually (10X Microscope)	No blistering, peeling, cracking allowed.
Dimensional	Measure	IAW DMWR 9-2350-264-2
Surface Finish	Measure	IAW DMWR 9-2350-264-2

M1A1 Cannon Cradle Repair



Future Projects

- Investigate additional candidates for ESD Repair Process
  - M88/M60 Roadwheel Arm Spindle
  - M198 Recoil Rod